sulphate group also, which have the same relation to each other as the potash salts.

The relation of the salts of potash to those of soda, in times of equal diffusibility, appeared to be as the square root of 2 to the square root of 3; which gives the relation in density of their diffusion molecules, as 2 to 3. Hydrate of potash and sulphate of magnesia were less fully examined, but the first presented sensibly double the diffusibility of sulphate of potash, and four times the diffusibility of the sulphate of magnesia. If these times are all squared, the following remarkable ratios are obtained for the densities of the diffusion molecules of these different salts, each of which is the type of a class of salts, hydrate of potash 1, nitrate of potash 2, sulphate of potash 4, sulphate of magnesia 16, with nitrate of soda 3 and sulphate of soda 6.

In conclusion, it was observed, that it is these diffusion molecules of the salts which are concerned in solubility, and not the Daltonian atoms or equivalents of chemical combination; and the application was indicated of the knowledge of the diffusibilities of different substances to a proper study of endosmose.

January 10, 1850.

GEORGE RENNIE, Esq., Vice-President, Treasurer, in the Chair.

The Right Rev. The Lord Bishop of Manchester was admitted into the Society.

The following papers were read:—

1. "Experiments and Observations upon the Properties of Light." By Lord Brougham, F.R.S. &c.

The author states that the optical inquiries of which he here gives an account were conducted in the first instance under the most favourable circumstances, arising from the climate of Provence, where they were commenced, being peculiarly adapted to such studies: he further states that he subsequently had the great benefit of a most excellent set of instruments made by M. Soleil of Paris; remarking, however, that this delicate apparatus is only required for experiments of a kind to depend upon nice measurements, and that all the principles which he has to note in this paper as the result of his experiments can be made with the most simple apparatus and without any difficulty or expense. His statement of the results of his experiments is thrown into the form of definitions and propositions, for the purpose of making it shorter and more distinct, and of subjecting his doctrines to a fuller scrutiny. He premises that he purposely avoids all arguments and suggestions upon the two rival theories, the Newtonian or Atomic, and the Undulatory.

The following are the author's Definitions and Propositions.

Definitions.

1. *Flexion* is the bending of the rays of light out of their course in passing near bodies.

2. Flexion is of two kinds—*inflexion*, or the bending towards the body; *deflexion*, or the bending from the body.
3. *Flexibility*, *deflexibility*, *inflexibility* express the disposition of the homogeneous or colour-making rays to be bent, deflected, inflected by bodies near which they pass.

Proposition I.

The flexion of any pencil or beam, whether of white or of homogeneous light, is in some constant proportion to the breadth of the coloured fringes formed by the rays after passing by the bending body. Those fringes are not three, but a very great number, continually decreasing as they recede from the bending body, in deflexion, where only one bending body is acting; and they are real images of the luminous body by whose light they are formed.

Proposition II.

The rays of light when inflected by bodies near which they pass are thrown into a condition or state which disposes them to be on one side more easily deflected than they were before the first flexion; and disposes them on the other side to be less easily deflected: and when deflected by bodies they are thrown into a condition or state which disposes them to be more easily inflected, and on the other side to be less easily inflected than they were before the first flexion.

Proposition III.

The disposition communicated to the rays by the flexion is alternative; and after inflexion they cannot be again inflected on either side; nor after deflexion can they be deflected. But they may be deflected after inflexion, and inflected after deflexion, by acting on the sides disposed, and not by acting upon the sides polarized.

Proposition IV.

The disposition impressed upon the rays, whether to be easily deflected or easily inflected, is strongest nearest the first bending body, and decreases as the distance increases.

Proposition V.

The fringes made by the second body acting upon the rays deflected by the first, must, according to the calculus applied to the case, be broader than those made by the second body deflecting those rays inflected by the first.

Proposition VI.

When one body only acts upon the rays, it must, by deflexion, form them into fringes or images decreasing as the distance from the bending body increases. But when the rays deflected and disposed by one body are afterwards inflected by a second body, the fringes will increase as they recede from the direct rays. Also when the fringes made by the inflexion of one body, and which increase with the distance from the direct rays, are deflected by a second body,

the effect of the disposition and of the distances is such as to correct the effect of the first flexion, and the fringes by deflexion of the second body are made to decrease as they recede from the direct rays.

Proposition VII.

It is proved by experiment that the inflexion of the second body makes broader fringes or images than its deflexion, after the deflexion and inflexion of the first body respectively; and also that the deflexion fringes decrease, and the inflexion fringes increase with the distance from the direct rays.

Proposition VIII.

The joint action of two bodies situated similarly with respect to the rays which pass between them so near as to be affected by both bodies, must, whatever be the law of their action, provided it be inversely as some power of the distance, produce fringes or images which increase with the distance from the direct rays.

Proposition IX.

It is proved by experiment that the fringes or images increase as the distance increases from the direct rays.

These propositions are illustrated by particular instances, and their truth is shown by experiments and by some mathematical investigations. The author concludes his paper by a few observations tending further to illustrate and confirm the foregoing propositions, and for the purpose of removing one or two difficulties which had occurred to others until they were met by facts, and also of showing the tendency of the results at which he had arrived.

2. "Electro-Physiological Researches."—7th Series. By Signor C. Matteucci. Communicated by W. R. Grove, Esq., F.R.S.

In this memoir, Prof. Matteucci, after recapitulating the results of his previous researches on electro-physiology, published in the Philosophical Transactions, proceeds to the relation of new experiments. He first shows that nervous filaments made to conduct an electric current in a liquid are not capable, like metallic wires, of acting as electroids, and giving rise to electro-chemical decomposition. The solution employed was that of iodide of potassium; the nerves, two large ones taken from a living animal, each of which was separately attached to the metallic extremities of a pile of fifteen couples. No trace of decomposition followed; and he concludes from hence, that the conductibility of nervous matter is due to the liquid part of the matter itself.

He then gives further experiments on the relative conductibility of muscles and nerves, with a view to ascertain whether, when a current was impelled through a mass of muscle, any part of the current might have passed through the nervous filaments spread through that muscle. For this purpose he inserted the nerve of a galvanoscopic frog into a hole made in a piece of dead muscle, through which he then passed a very powerful current: no contraction followed